

the area the snowfall was below the normal. However, owing to the earlier snows, the average flow of irrigation water is expected.

RIVERS.

River stages in Oklahoma continued below the normal, except that there was a rapid rise in the Grand and Neosho Rivers on the 25th and 26th, due to heavy local rains. In Kansas the rivers continued low with but slight changes during the month. No high stages occurred in the Arkansas River during the month, but there was sufficient water for navigation.

Heavy rains in the Black and White River Valleys, Ark., March 21 to 26 caused moderate floods in the Black River and in the lower reaches of the White River. So far as known no damage resulted from these floods. No flood occurred in the Red River, but there was a sharp rise in the lower reaches of this stream about the middle of the month. Several sharp rises occurred during the month in the upper Ouachita, but the lower Ouachita remained nearly stationary.

The Mississippi River was rising at the close of the month at all stations below St. Louis as a result of the unprecedented flood coming out of the Ohio drainage basin. The stages in feet, on March 31, were as follows: Memphis, 36; Helena, 41.5; Arkansas City, 42; Vicksburg, 39.6; Natchez, 39.2; Baton Rouge, 29.2; Donaldsonville, 22.7; and New Orleans, 14.5.

SEVERE LOCAL STORMS, LOUISIANA.

By ISAAC M. CLINE, District Forecaster.

Local storms of unusual severity occurred in Sabine, Natchitoches, Grant, and Winn Parishes during the forenoon of March 13, 1913. The storm occurred about 9.40 a. m. near Florence, Sabine Parish; about 10 a. m. at Provencal, Natchitoches Parish; and about 10.30 a. m. in Winfield Parish. Four persons were killed near Florence and one at Provencal, and 46 persons were reported injured. At Provencal the property damage was about \$50,000; but in other sections the damage was scattered and not heavy. The path of greatest destruction ranged from 300 feet to half a mile in width.

TORNADOES IN ARKANSAS, MARCH, 1913.

By H. F. ALCIATORE, Section Director.

Tornadoes occurred in parts of Union County on March 13 between 9 and 10 a. m. About 48 persons were injured, one of whom, a woman, died shortly after the storm from the result of her injuries. The greatest damage was done by the storms in the vicinity of Caledonia, Hibank, and Blanchard Springs, the loss in stores, farmhouses, etc., being estimated at \$24,000. It is interesting to note that the pendent, funnel-shaped cloud, typical of tornadic disturbances, was observed in every case. The width of the path of greatest destruction varied from 100 yards at Caledonia to one-half mile at Blanchard Springs.

On March 20, between 9.30 and 10.30 p. m., tornadoes of great violence occurred at Hoxie, Gillett, Eudora, Brinkley, Walnut Ridge, Star City, McArthur, Nettleton, Newport, Wynne, Pine Bluff, and in the vicinity of McGehee, Jonesboro, and Paragould. One person was killed in the Eudora storm. Three persons were injured at Hoxie, 2 at Walnut Ridge, 2 in the vicinity of Jonesboro, and 3 near Paragould. The greater portion of the business districts were destroyed at Hoxie and Walnut Ridge, the total loss at those two places alone being

estimated at \$87,000. The losses at the other places named ranges from \$500 to \$4,000.

On March 24, about midnight, tornadoes did considerable damage at Harmony, Rumley, Powers, and the vicinity of Leslie. Three persons were killed and 13 were injured and the total loss to property was about \$16,000.

SEVERE STORMS IN WESTERN TENNESSEE.

By S. C. EMERY, Local Forecaster.

During the afternoon of March 13, 1913, several violent and destructive storms occurred in northern Mississippi and western Tennessee. The regions affected in Tennessee were the counties lying immediately west of the Tennessee River and extending from the northern line of Mississippi to the counties bordering on Kentucky, comprising in all about seven counties. These storms are reported to have moved in a northeasterly direction, attended by heavy rain and an unusual amount of lightning. The path of destruction ranged from a quarter to a half mile in width. Several correspondents report a funnel-shaped cloud traveling at a rapid rate with a bounding motion, striking the earth and rising again, and again descending. At times it appeared to merge into the clouds which were low and threatening.

These storms occurred in connection with the passage of a low-pressure area of unusual energy, the center of which moved from Amarillo, Tex., at 7 a. m. (March 13) to central Iowa, at 7 p. m., where the pressure at that hour was 29.24 inches. At the time the Tennessee storms were in progress, the center of the barometric depression was probably over Kansas, and heavy rains were falling in Louisiana, Mississippi, Alabama, Georgia, and portions of Tennessee. To the south and east of the center of disturbance the temperature ranged from 60° to 70°, while in South Dakota and western Nebraska had fallen to 20° to 30° and was snowing heavily.

The most destructive storm of the series and which without doubt was a tornado, probably originated in Lafayette County, Miss., near the town of Oxford from which place it moved northeastward and passed about 2 miles west of Hickory Flat, Miss., at 12.30 p. m., where 12 houses were destroyed and one person killed and much farm property damaged or destroyed. The storm next appeared at the southwestern corner of Hardeman County, Tenn., near Middletown, where 5 persons were killed and at least 20 buildings destroyed. From Middletown the storm passed on through the northern portion of McNairy County, destroying 10 buildings near Finger and McNairy in that county, but no fatalities are reported. It passed about 7 miles to the east of Henderson, Chester County, Tenn., causing the death of 3 persons and blowing down some farm buildings, fences, etc., along its path, reaching Lexington, Tenn., at 2.15 p. m. At this place 100 or more buildings were destroyed, 57 being residences, some of which were the most substantial in the city, while shade trees that had ornamented the town for generations were strewn in all directions. As far as known, only 3 persons were killed at this place. From Lexington the storm continued its northeasterly course through the southeast corner of Carroll County, striking the town of Cavvia, where several buildings were destroyed. At Cavvia the storm cloud is reported to have been funnel-shaped and very destructive wherever it came in contact with the earth. The next town in the path of the storm was Camden, Benton County, Tenn., where about 40 buildings were destroyed, one man lost his life, and several persons were seriously injured.

A severe storm occurred at Beech Bluff on the 13th, near the eastern line of Madison County, also at Luray and Huron a few miles east in Henderson County. At Huron one farmer was killed and several farm buildings destroyed.

A severe windstorm, thought to have been a tornado passed through the northeast section of Hardeman County, Tenn., causing the death of 6 persons and destroying considerable farm property. At Bolivar in that county, a schoolhouse was blown entirely away, and trees and fences were blown down. Also on the same day and at about the same hour as the above, 2.30 p. m., a destructive wind storm struck the town of Tishomingo, Miss., causing damage to the amount of \$100,000, and among the buildings destroyed were 37 residences, 6 stores, a warehouse, flour mill and the public-school building. Every residence in the town was more or less injured, and 2 persons were killed. Beside those killed, 24 persons were severely injured in the town and 10 in the country. The correspondent at Tishomingo writes; "About 10 a. m. a very heavy thunderstorm occurred, during which 3 buildings within a radius of 300 feet were struck by lightning; 2 of these buildings were stores that a few hours later were destroyed by the storm. About one minute before the storm struck a sudden darkness settled over the place and a peculiar green tint was seen to cover everything in sight, even inside the houses."

ELECTRICAL STORM OF MARCH 23 IN KANSAS.

By S. D. FLORA, Observer, Weather Bureau.

An unusually severe electrical storm of the kind described in the Monthly Weather Review of June, 1912, occurred in the three western tiers of Kansas counties on March 23, Easter Sunday.

During this storm windmills, especially steel mills mounted on wooden supports, became so charged with static electricity that any person touching them received a distinct shock, and in some cases the shock was a severe one. The cooperative observer at Tribune. Greely

County, reports an instance where sparks 2 or 3 inches long were drawn from a wire running to a windmill.

Telephone and telegraph wires and wire fences also became charged sufficiently to give quite noticeable shocks, and in Scott County, where the disturbance seems to have been most severe, one case is reported where a prairie fire that started on the farm of Mr. J. W. Lough, near Scott County, is thought to have originated from electric sparks caused by a break in a wire fence. As numerous instances were reported where distinct sparks were noted on holding the broken ends of fence wires near together, it is altogether possible that dry grass might have been ignited by a similar phenomenon, though it would certainly be a novel way of accounting for a conflagration.

The cooperative observer at Scott City also reports that sparks passed from a person's finger held near a horse's ear and the horse would shake its head as though it felt the contact of the spark.

In Thomas County it was reported that all green vegetation was killed and in Sheridan County the wheat turned brown after the storm.

These electrical phenomena occurred during high southwest to west winds that attended the rapid eastward passage of an area of low pressure central over Denver, Colo., on the morning of the 23d.

They were generally experienced from early morning until about sunset and during this time the air was filled with dust and was very dry, with no precipitation during the storm, though light rain fell in the northwestern part of the State late in the evening.

Maximum temperatures on this day ranged from 65° to 75° in this part of the State and minimum temperatures from 25° to 40°. The sky was reported to be obscured by a leaden or copper-colored haze, probably due to the dust in the air.

For most persons the day had a very depressing effect, but, as in the case of the damage to tender vegetation, it remains to be proven how much of this was due to the electrical condition of the air and how much was a natural consequence of the dry and abnormally warm winds